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09/810,962	03/16/2001	Atsuo Omaru	09792909-4809	7248

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EXAMINER
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DOVE, TRACY MAE

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 05/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/810,962

Applicant(s)

OMARU ET AL.

Examiner

Tracy Dove

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 08 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) 15-46 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## **DETAILED ACTION**

### ***Priority***

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Note priority is not claimed for Japanese application JP 2001-013338 filed in Japan on 1/22/01.

### ***Election/Restrictions***

Applicant's election of Group I in Paper No. 6 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

### ***Claim Objections***

Claim 1 is objected to because of the following informalities: the parenthesis should be removed and the period belongs at the end of the claim. Appropriate correction is required.

Claim 2 is objected to because of the following informalities: in line 4 "defferential" should recite "differential". Appropriate correction is required.

Claims 1, 3-7 and 9-11 are objected to because of the following informalities: in claim 1, line 4, "10 and below" should recite "10 or below"; in the last line of each of claims 3, 4, 7, 9 and 10 "and more" should state "or more"; in the last line of each of claims 5 and 6 "and below" should state "or below"; and in claim 11, lines 3-4 "and below" should recite "or below". Appropriate correction is required.

Claim 13 is objected to because of the following informalities: the parenthesis should be removed. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8 and 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 recites a reform rate within the range of 1 to 38 which is indefinite because it is unclear how the reform rate is obtained. The specification does not provide adequate disclosure regarding a reform rate (see page 11).

Claim 13 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: the claim does not define "x" and "y".

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the

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reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1, 3-6 and 9-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Hayashi et al., JP 10-334915.

Hayashi teaches a rechargeable battery having an electrode comprising graphite particles. A dynamic energy process is applied to a graphite material so that the apparent density ratio between before and after the process becomes 1.1 or above. The apparent density ratio between before and after the process equals the tap density after the process/tap density before the process, and this is to become the index of sphericity. See abstract.

The intensity ratio  $R$  of a Raman spectrum is preferably 0.4 or less. In the Raman spectrum analysis, the intensity  $I_A$  of peak  $PA$  near  $1580\text{ cm}^{-1}$  and the intensity  $I_B$  of peak  $PB$  near  $1360\text{ cm}^{-1}$  were measured (col. 8, lines 47-54). Therefore,  $R=I_B/I_A=H_{sd}/H_{sg}$  and  $H_{sg}/H_{sd}=1/R=G_s$ . Since  $R$  is 0.4 or less, Hayashi teaches  $G_s$  is 2.5 or more.

The tap density ratio before and after processing is 1.7 or greater, more preferably 1.1 or greater. It is desirable to have a tap density after processing of 0.5-2 g/cc (see page 4, paragraph 0023-0024). The tap density of the graphite material is preferably in the range of 0.7-1.2 g/cc (see page 7, paragraph 0042). The true density of the graphite material is 2.25 g/cc or more (claim 2). Thus a packing characteristic index (tap density/true density) of Hayashi may be 0.53 ( $1.2/2.25$  = tap density/true density).

Table 4 shows different graphite material properties before and after a dynamic energy process/treatment. The SA in Table 4 represents surface area with the surface area of the graphite being  $19.1\text{ m}^2/\text{g}$  before treatment and  $8.9\text{ m}^2/\text{g}$  after treatment (Example 13). The surface area after treatment is 2.1 times that before treatment. The energy process is specifically

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pulverization. Hayashi teaches an electrode having a graphite material with a (d002) distance between layers of 0.34nm or less (claim 2).

Thus the claims are anticipated.

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Claims 1, 3, 6, 9, 13 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Kitagawa et al., US 6,403,259.

Kitagawa teaches a nonaqueous electrolyte secondary cell comprising a positive electrode, a negative electrode and a separator (col. 4, lines 3-12). The negative electrode contains a graphite powder having an R value, that is peak intensity ratio of  $1360\text{ cm}^{-1}$  in relation to the peak intensity of  $1580\text{ cm}^{-1}$  in the argon ion laser Raman spectrum, of 0.3 or less (col. 3, lines 22-42). In the Raman spectrum analysis, the intensity IA of peak PA near  $1580\text{ cm}^{-1}$  and the intensity IB of peak PB near  $1360\text{ cm}^{-1}$  were measured (col. 8, lines 47-54) (Claim 1). Therefore,  $R=IB/IA=H_{sd}/H_{sg}$  and  $H_{sg}/H_{sd}=1/R=G_s$ . Since R is 0.3 or less, Kitagawa teaches  $G_s$  is 3 or more. (Claim 6) The plane interval (d002) of the graphite is 3.37 angstroms (0.337 nm) or less (col. 3, lines 34-37). (Claim 13) The positive electrode material may be a lithium cobalt oxide, a lithium nickel oxide or a lithium manganese oxide material (col. 7, lines 37-41).

Kitagawa teaches a nonaqueous electrolyte secondary cell comprising a positive electrode, a negative electrode and a separator (col. 4, lines 3-12). The negative electrode contains a graphite material that exhibit a tapping density of 0.5 g/cc or more. Table 3 shows a graphite material having a tapping density of 1.05 g/cc (#33) and a graphite material having a tapping density of 1.26 g/cc (#34). (Claims 3, 9)

Figure 2 shows a cylindrical cell having a spiral electrode group configuration. A band-like positive electrode and negative electrode are spirally wound with a separator there between. The positive active material paste is applied to both sides of an aluminum foil and the negative active material paste is applied to both sides of a copper foil. See col. 11, line 58-col. 12, line 54 (Claim 14).

Thus the claims are anticipated.

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Claim 2 is rejected under 35 U.S.C. 102(e) as being anticipated by Ryu et al., US 2002/0006551 A1.

Ryu teaches a carbonaceous active material for a lithium ion secondary battery. Conducting a differential thermal analysis on the carbonaceous active material result in the displaying of at least two exothermic peaks (abstract). It is preferable that the two or more exothermic peaks occur at between 500-1000°C, and a difference between the exothermic peaks is less than 200°C (paragraph 0012). The carbonaceous material may be a surface modified natural or artificial graphite, or may be a combination of natural or artificial graphite with amorphous carbon (paragraph 0013). Figure 1 shows the differential thermal analysis results of the active material of Ryu and comparative examples.

Thus the claim is anticipated.

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Claims 1, 2, 6-8 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Yoon et al., US 6,482,547.

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Yoon teaches lithium secondary battery having a negative active material including a crystalline carbon core (graphite) and an amorphous carbon shell. The negative active material has two exothermic peaks of the differential thermal analysis at 1000°C or less (abstract). Figure 4 depicts the differential thermal analysis of the negative active material. The specific surface area of the negative active material is preferably 0.5-6 m<sup>2</sup>/g (col. 4, lines 21-22). The crystalline carbon of the negative active material has a plane distance of d002 of 3.35-3.4 Å of X-ray diffraction plane distance of the (002) plane and the amorphous carbon has a plane distance of d002 of 3.4-3.8 Å of X-ray diffraction plane distance of the (002) plane (col. 5, lines 60-65). The negative active material has optimized advantages due to the crystalline graphite and the amorphous carbon. If a differential thermal analysis is performed on the crystalline graphite, a single peak occurs at 800°C or more, while a single exothermic peak occurs at 700°C or less for the amorphous carbon (col. 6, lines 18-27). The negative active material has the crystalline graphite and the amorphous carbon having a turbostratic structure. The crystalline carbon has an intensity ratio I(1360)/I(1580) of a Raman Spectroscopy of less than 0.3 (col. 7, lines 7-19). The lithium battery has a positive electrode; negative electrode and a nonaqueous electrolyte (col. 3, lines 9-19 and col. 7, lines 27-col. 8, lines 13). The positive active material may be LiCoO<sub>2</sub> (col. 8, lines 14-18).

Thus the claims are anticipated.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person



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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoon et al., US 6,482,547.

See discussion of Yoon above.

Yoon does not explicitly state the carbonaceous active material has a rhombohedral structure.

However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Yoon teaches the crystalline carbon may have various structures. The crystalline carbon (graphite) may be non-uniform, disk-shaped, flake, spherical or fibrous carbon particles, or two or more of the graphite particles may be mixed together (col. 5, lines 4-13). One of skill would have found a rhombohedral structure for the graphite active material obvious in view of the teachings of Yoon. Specifically, Yoon teaches the crystalline carbon may have various structures.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is (703) 308-8821. The Examiner may normally be reached Monday-Thursday (9:00 AM-7:30 PM). My supervisor is Pat Ryan, who can be reached at (703) 308-2383. The Art Unit receptionist can be reached at (703) 308-0661 and the official fax numbers are 703-872-9310 (after non-final) and 703-872-9311 (after final).



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**Technology Center 1700**

May 14, 2003